ACES

Airspace Concepts Evaluation System

Purpose:
Develop and provide a national resource for conducting high-fidelity, system-level assessments of new operational concepts for air transportation

Modeling Environment:
- Designed for expansion to provide levels of complexity not realizable with current simulators
- Designed for "plug and play" models, to allow for easy reconfiguration of the simulation to meet specific research requirements
- Designed for easy integration of new improved models to build the "model toolbox" capability and to provide incentive for the research community to invest in the system
- Designed to allow for different levels of fidelity to be incorporated into a simulation, allowing the researcher to tailor the simulation to meet specific needs

Schedule:
- Build 1 (completed Dec 2002) extended proof of feasibility using DOD HLA/RTI and low-medium fidelity modeling
- Build 2 (Dec 2003) and Build 3 (June 2004) increase scope with new models, such as human performance and CNS, and with medium-high fidelity modeling

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Overview

The Airspace Concepts Evalutation System (ACES) is a modeling and simulation environment for the air transportation system that is being developed at the NASA Ames Research Center and which is being supported by NASA's Airspace Systems Program. The ACES capability captures the key feedback response mechanisms of the National Airspace System (NAS). The agent-based modeling approach that is being used represents the individual behaviors of the airspace participants and captures the critical ripple effect of one user's actions on other system participants. This modeling approach isolates the individual models so they can continue to be enhanced, improved, and modified to represent new concepts with low development impact on the overall simulation system. ACES Build 1 is now operational within the Virtual Airspace Modeling and Simulation Lab at NASA Ames. Future software releases will enhance the modeling toolbox by adding new NAS component models, by increasing model fidelity, and by insuring usability for airspace analysts.

Accomplishments

In December 2002, ACES Build 1 was completed, which demonstrated the use of the Department of Defense's High Level Architecture infrastructure with agent-based software and low-to-medium fidelity models of NAS components.

In March 2003, the simulated NAS operational performance was validated using actual data from the current NAS for high and low traffic days, and Build 1 was officially released.

In August 2003, ACES was used to perform a high level system-wide assessment of selected future NAS concepts. A presentation of the results was prepared for the Associate Administrator of NASA's Office of Aerospace Technology, which demonstrated the significance of delays for future traffic demands and that assessed concepts may substantially reduce these delays.